

2nd Mediterranean Water Forum

Instruments for Groundwater management

Murcia – 25th of November



1. Introduction

- Groundwater overexploitation: key figures
- The tragedy of the Commons

2. Instruments for groundwater management

- Quantity instrument
- Pricing instrument
- Mixed instrument
- Aquifer contract

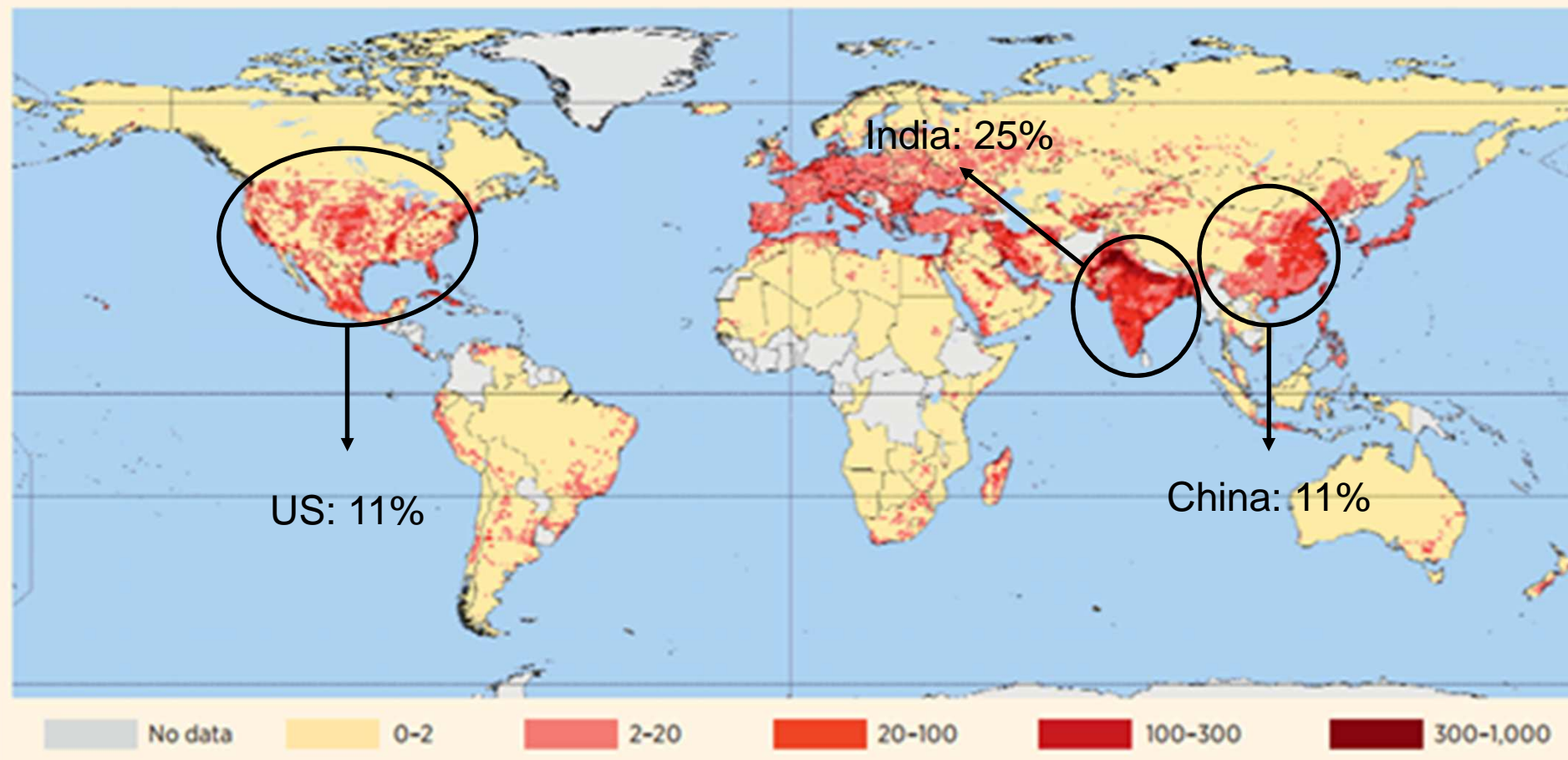
3. Comparative analysis: centralized management vs decentralized management

- Case studies
- Lessons and recommendations

Key figures

- Global groundwater exploitation multiplied by **3 in 50 years**
- Around **1 000 km³ abstracted** per year:
 - 67% for irrigation
 - 22% for drinking water
 - 11% for industries

Key figures



The tragedy of the Commons

- Open access to the resource
- A situation with competition to use the water, and
- Many users who behave independently
- **Externalities**: consequence of the withdrawal of one user on the other users

Increase in pumping costs

- At the end: ineluctable overexploitation of the resource

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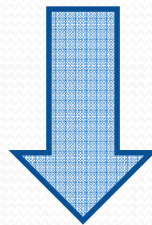
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Instruments for groundwater management

- **Quantity instrument:** quotas
- **Pricing instrument:** taxes
- **Mixed instrument:** water right market
- **Local and decentralized instrument:** Aquifer contract

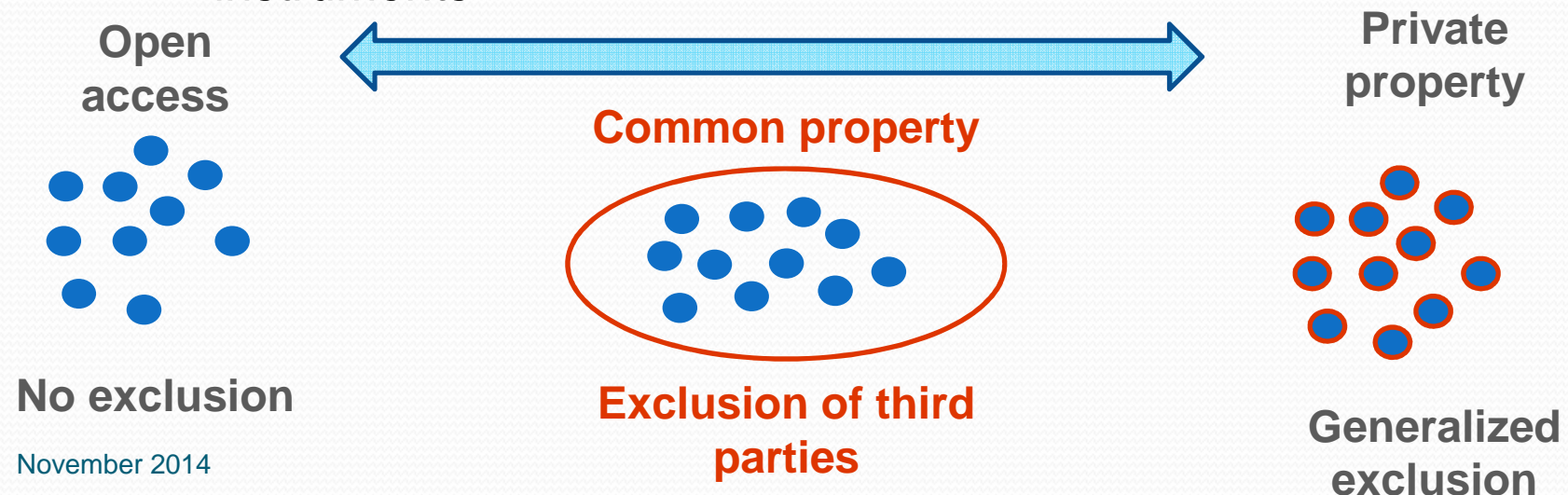


Studied by Elinor Ostrom, Nobel Prize in economics, 2009



Aquifer contract

- Contract between users, and between Administration and users
- Self regulation by users
- Advantages:
 - Better knowledge of the resource, the costs, etc.
 - Limited transaction costs
 - Social empowerment
 - Institutional framework for the implementation of the other instruments



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QUOTAS: Centralized management vs decentralized management

	ISRAEL Centralized management	BEAUCE AQUIFER - France Decentralized management
Water management instrument	Quotas + Incentive pricing system	Quotas implemented within a water development and management plan (SAGE)
Stakeholders targeted by the instrument	Majority of farmers and a few industrials	Farmers
Date of implementation	The mid-1980s	1999
Stakeholders who impulsed the implementation of the instrument	State	Local stakeholders (farmers) and the State (Prefects)
Description of the instrument	Nationwide implementation Agricultural sector = Adjustment variable during drought	Local implementation: definition of 4 geographic sectors Individual quotas defined at the beginning of the season and revised during the season according to the aquifer's level.
Socioeconomic evaluation of the instrument	Reluctance of farmers and strong opposition of the agricultural lobbies Nevertheless the agricultural productivity has increased	Farmers acceptance
Environmental evaluation of the instrument	No environmental impact: Reduction of agricultural withdrawals offset by the increase in urban abstractions	Compliance with the quotas

TAXES: Centralized management vs decentralized management

	THE NETHERLANDS Centralized management	AQUITAIN AQUIFERS - France Decentralized management
Water management instrument	Groundwater abstraction tax	Increase in water abstraction tax + quotas within a water development and management plan (SAGE)
Stakeholders targeted by the instrument	Mostly drinking water users	Drinking water
Date of implementation	1995	2003
Stakeholders who impulsed the implementation of the instrument	The State	Local Stakeholders (councillor) supported by the Water Authority
Description of the instrument	Nationwide implementation	Localized overexploitation but increase in taxes for all the users Increase in taxes for financing creation of water resource alternatives
Socioeconomic evaluation of the instrument	Conflicts between users Lack of equity: Drinking water users financed the agricultural externalities Tax removed because of inefficiency	The measures are considered a success for the majority of the stakeholders
Environmental evaluation of the instrument	No impact : Decrease in drink water abstraction offset by the withdrawals of the exempt users.	Decrease in drinking water withdrawals per inhabitant of 14% between 2003 and 2010

WATER RIGHT MARKET: centralized management vs decentralized management

	CHILE Centrallized management	RAYMOND AQUIFER - CALIFORNIA Decentralized management
Water management instrument	Water rights market	Water rights market
Stakeholders targeted by the instrument	All users	All users (mostly drinking water)
Date of implementation	1981	1955
Stakeholders who impuled the implementation of the instrument	The State	The town of Pasadena (the main user)
Description of the instrument	Nationwide implementation	Trade between users of Raymond aquifer (15 users)
Socioeconomic evaluation of the instrument	<ul style="list-style-type: none"> - A few transactions - Lot of obstacles to the proper functioning of the market (high transaction costs, cultural habits, geographic and technical constraints...) - No safeguard against speculation on water 	Acceptance of the instrument by all the users
Environmental evaluation of the instrument	No major impact on the resources	Compliance with the quotas Sustainability of the aquifer

Lessons and recommendations

- Implementation of the instrument in a decentralized framework is efficient
 - Favours acceptability and solidarity
 - Limits users conflicts
 - Adapted to the local context
 - Quite easily adjustable to the evolution of the uses
- ➔ **Sustainability of the uses and the resource**
- Main findings and recommendations from the Mediterranean cases studies:
 - Creation of a structure which carries the process
 - Neutrality of the decision-making body
 - Consistency with the other policies implemented on the territory

Let's put it in action

- National Workshop on groundwater management, Skhirat, Morocco, March 2014
 - Definition of prerequisites of an aquifer contract
 - Reflection on the minimum content of an aquifer contract
 - List of conditions for the implementation and success of the process
- Your experience? Projects? Point of view? Expectations? ... on the implementation of decentralized groundwater management

Thank you for your attention



Appendix 1: Design principles for common pool resource institutions (Ostrom, 1990)

- 1- Clearly define boundaries (effective exclusion of external un-entitled parties)
- 2- Rules regarding the appropriation and provision of common resources that are adapted to local conditions;
- 3- Collective-choice arrangements that allow most resource appropriators to participate in the decision-making process;
- 4- Effective monitoring by monitors who are part of or accountable to the appropriators;
- 5- A scale of graduated sanctions for resource appropriators who violate community rules;
- 6- Mechanisms of conflict resolution that are cheap and of easy access;
- 7- Self-determination of the community recognized by higher-level authorities;
- 8- In the case of larger common-pool resources, organization in the form of multiple layers of nested enterprises, with small local CPRs at the base level

Appendix 2: Obstacles and suggestions for resolution

Obstacles		Résolution
Understanding and involvement in the project	Reluctance of users	Information campaigns, presence of relay actors, awareness
	Reluctance of the Administration to delegate work	Discussion, meeting, information sharing
	Lack of coordination between local policies	Discussion, meeting, information sharing
	No compliance with the water management rules	Awareness, effective monitoring
Financial means - Human and material resources	Cost of drilling declararation	Financial aids
	No compliance with the water management rules	Give the necessary means to the authority in charge
	Lack of knowledge about abstractions	Human and material investments (studies, meters, employees, ...)
Implementation of the project	Arduous and slow process	According to the context: strengthen the facilitation and the organization, gather the stakeholders around short-term projects, ...
	Difficulties encountered during the implementation of a precursor process (hight transaction costs, lack of experience, lack of information, ...)	<ul style="list-style-type: none"> - Progress step by step - Flexibility to adjust the process - Establishment of test areas - Restriction of the process to a homogeneous sector (same users,same cultural values, etc.)
	Approach dictated by basin authorities	Give more freedom to local actors in the development of the approach